**3GPP TSG-SA5 Meeting #148eS5-233396**

**online, 17th April 2023 – 25th April 2023**

**Source: Samsung**

**Title: pCR 28.903 Federation Management**

**Document for: Approval**

**Agenda Item: 6.9.6.2**

# 1 Decision/action requested

***The group is asked to discuss and approve the proposals.***

# 2 References

None

# 3 Rationale

This contribution provides updated solution for 6.2. Key Issue#2: Issue for federation management

# 4 Detailed proposal

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| **First modification** |

## 6.2. Key Issue#2: Issue for federation management

6.2.1 Description

GSMA requirements related to federation management are divided into E/WBI requirements and Federation Manager Role requirements, which are introduced in clause 5.1.2 and clause 5.2.3 of [2] respectively.

- Based on the description in clause 5.1.2 of [2]:

The Federation Management functionality within the Operator Platform (OP) enables it to interact with other OP instances, often in different geographies, thereby providing access for the Application Providers to a larger footprint of Edge Clouds, a more extensive set of subscribers and multiple Operator capabilities.

This Key issue is about enabling two OPs establishing federation relationship between each other and sharing available location(s) at which the edge services are provided, resource available at each location, federation expiry etc.

The OP which initiates federation relationship is called leading/originated OP. The OP which receives federation relationship request is called partner OP.

The following functionalities are enabled with established federation relationship:

* Federated EAS resource reservation management: This is intended for an OP to reserve resources for an application provider, with the other OP, when the application provider initiate the reservation using NBI.
* Federated EAS deployment and termination: This will be used by an OP to instantiate an application to edge clouds of other OP as requested by application provider over NBI.
* EDN sharing: This is intended for OPs to share EDN among each other.

Based on the description in clause 5.2.3 of [2]:

GSMA E/WBI API definition [8] provides information on various API and associated parameters and data models to achieve GSMA federation requirements.

Table 6.2.1-1 concludes the Federation Manager Role requirements and related E/WBI APIs, and shows the comparison with 3GPP SA5 management capabilities. The requirement of Settlement is set for charging system and is therefore not shown in table below.

Table 6.2.1-1

|  |  |  |  |
| --- | --- | --- | --- |
| GSMA Federation Manager Role requirement and corresponding API | GSMA E/WBI API | 3GPP management capability | Gap analysis |
| Federation and platform interconnection – General:  *This capability is achieved by the federation E/WBI interface; to interconnect OPs belonging to different operators, enterprises or others. The communication between federated entities shall support a distributed tracking mechanism that allows end-to-end tracking across these federated entities.*(see clause 5.2.3.1.1 of [2]) | East/West Bound Interface Management API | MnS for federation requirements is FFS. | GSMA defines East/West Bound Interface Management API (clause 3.1.1 of [8]) and OP data model (clause 3.1.1.7 of [8]) to realize the handshake between two Ops, while 3GPP TR 28.824 [12] has discussed the MnS consumer (i.e. API invoker) registration mechanism by reusing CAPIF. There could be an enhancement in 3GPP on (external) MnS consumer management to catch OP features after evaluating the East/West Bound Interface Management API. |
| Federation and platform interconnection - Authentication/authorisation:  *Federating OPs are likely to belong to different entities in different security domains. Therefore, the capability to exchange authentication and authorisation between federated OPs is required.* (see clause 5.2.3.1.2 of [2]) | No API definition for Authentication/ authorisation | Access control between MnS producer and MnS consumer (TS 28.533 [9]) | GSMA E/WBI API definition [8] doesn’t define API for Authentication/authorisation purpose. 3GPP describes the Access control between MnS producer and MnS consumer in clause 4.9 of TS 28.533 [9]. TR 28.817 [11] and TR 28.824 [12] discussed the access control for (external) MnS consumers, of which the normative work could be used to satisfy this requirement. SA5 may actively coordinate the outcome of access control with GSMA and evaluate whether the work can be reused by GSMA. |

Editor’s Note: Interaction with SA6 is necessary to ensure separation of concerns related with Federation solutions.

6.2.2 Requirements

**REQ-FUN-Federation-1:** ECSP management system shall have a capability to establishing federation relationship with the (external) MnS consumer (e.g. partner operator platforms).

**REQ-FUN-Federation-2:** ECSP management system shall enable federation relationship to include appropriate information including (not limited to) location(s) at which the edge services are provided, resource available at each location, federation expiry.

6.2.3 Potential Solutions

The solution proposes the following set of IOCs to manage the Edge Federation between multiple ECSP Management systems. The Participating Operator Platform (P-OP) is the operator who provides its EDN to be shared with Leading Operator Platform (L-OP). Both P-OP and L-OP are considered as two different ECSP Management System.

The EdgeFederation IOC is defined as the IOC representing the set of federation maintained by either the P-OP or L-OP. This IOC when instantiated represents a set of available federations. The IOC will contain the following attributes:

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| --- | --- | --- |
| Attribute Name | S | Description |
| participatingOPiD | CM | This identifies the P-OP.  This should only be present when the EdgeFederation IOC is being instantiated and maintained by L-OP. |
| leadingOPiD | CM | This identifies the originating/leading operator.  This should only be present when the EdgeFederation IOC is being instantiated and maintained by P-OP. |

The OperatorEdgeFederation IOC contains attributes to support the edge federation. An instance of OperatorEdgeFederation IOC should be created and configured for each federation to be maintained/provided by the P-OP or L-OP. When configured the attributes override those in parent EdgeFederation instance. This IOC when instantiated represents a particular available federation.

|  |  |  |
| --- | --- | --- |
| Attribute name | S | Description |
| federationID | M | This identifies the particular federation created. |
| federationExpiry | M | This defines the time post which the federation relationship shall expire. |
| leadingOPiD | CM | This identifies the originating/leading operator.  This should only be present when the EdgeFederation IOC is being instantiated and maintained by P-OP. |
| participatingOPiD | CM | This identifies the P-OP.  This should only be present when the EdgeFederation IOC is being instantiated and maintained by L-OP. |
| initiationTime | M | Date and time of the federation initiated by the L-OP. |
| offeredEDN | M | List of EDNs P-OP is willing to share. An EDN is represented by EdgeDataNetwork IOC as defined in 3GPP TS 28.538.  The solution requires EdgeDataNetwork IOC to be augmented with the information related with the available edge and infrastructure resources. The edge resources will include available EAS(s) and infrastructure resource will include available virtual resources e.g vCPU, vMemory, vDisk. |
| acceptedEDN | M | List of EDNs accepted by L-OP. An EDN is represented by EdgeDataNetwork IOC as defined in 3GPP TS 28.538.  The solution requires EdgeDataNetwork IOC to be augmented with the information related with the available edge and infrastructure resources. The edge resources will include available EAS(s) and infrastructure resource will include available virtual resources e.g vCPU, vMemory, vDisk. |
| resourceQuota |  | This defines the edge resource quota assigned to the L-OP. This will include virtual resources e.g vCPU, vMemory, vDisk. |

The OperatorEdgeDataNetwork IOC is, optionally defined to contain attributes to support an available edge data network. An instance of OperatorEdgeDataNetwork IOC should be created and configured for each EDN shared with another operator. When configured the attributes override those in the associated EdgeDataNetwork instance. The attribute of this IOC are same as defined for EdgeDataNetwork IOC in 3GPP TS 28.538. This IOC when instantiated represents a particular EDN shared with the L-OP.

The following figure depicts the federation establishment procedure between L-OP and P-OP.



1. In order to establish the edge federation with the P-OP, consumer send createMOI request to instantiate EdgeFederation IOC.
2. Producer send the response
3. Producer instantiate the OperatorEdgeFederation IOC providing details on the offered EDN.
4. Producer send notification for creation of the OperatorEdgeFederation IOC using notifyMOICreation as defined in 3GPP TS 28.532.
5. Consumer reads the OperatorEdgeFederation MOI using GetMOIAttributes operation to know the offered EDN and other related information.
6. Producer send the response
7. Based on the offered EDN list consumer decides on to which EDN it want to accept.
8. Consumer updates the value of acceptedEDN attribute, indicating the accepted EDN, using ModifyMOIAttributes operation.
9. Producer send the response. At this point the federation establishment is completed.
10. Based on the accepted EDN information, producer instantiate OperatorEdgeDataNetwork IOC to represent the accepted EDN which is shared with the L-OP.
11. The L-OP, behaving as Provisioning MnS Producer, instantiate the FederationIOC, OperatorFederation IOC and OperatorEdgeDataNetwork IOC reflecting the federation relationship with P-OP.

Note: The agreed federation information (e.g offered EDN and selected EDN) should be available to L-OP also so that L-OP can decide if it want to deploy an EAS on P-OPs network if and when required.

1. The Producer may decide to modify or delete the OperatorEdgeFederation MOI in order to update the federation relationship. The modification may be necessary in order to update the shared EDN. Whereas the deletion may be done in order to un-share an EDN.
2. The notification of the update will be send to the consumer using the notification defined in 3GPP TS 28.532.
3. The L-OP, behaving as Provisioning MnS Producer, update the FederationIOC, OperatorFederation IOC and OperatorEdgeDataNetwork IOC for each update notification received.